CONFIDENTIAL

25X1

25X1

October 24, 1956

25X1

25X1

25X1

SUBJECT: Contract ED-94
Task Order No. 2

In accordance with Article 2 of the basic contract, there are forwarded herewith two (2) copies of the Monthly Progress Report for September, 1956 on Task Order No. 2 of ED-94. The report is dated October 8, 1956. This report is UNCLASSIFIED. An additional copy is being held 25X1 by the project engineer for the use of your personnel while at this location.

In connection with this monthly progress report, the following information is submitted:

Total expenditures to 8-31-56	$4,658
Outstanding commitments as of 8-31-56	None
Funds remaining as of 8-31-56	$55,658

Very truly yours,

25X1

Assistant Manager
Government Contract Administration

TRR:val
f-14608
Enclosures
cc:

25X1

CONFIDENTIAL

Monthly Progress Report
September 1956

Task Order No. 2
Contract No. RD-94

Audio Noise Reduction Circuits

The object of this project is to develop a noise reduction circuit suitable for use in separating speech intelligence from a signal containing speech and noise when the speech intelligence is masked by the noise. The proposed method consists of passing the signal through several frequency selective channels. Each channel contains a non-linear element which discriminates against the noise when the speech information in the channel is greater than the noise.

During September a study has been made to determine the effect on the signal-to-noise ratio of passing wide band speech and noise through narrow band pass filters. It is known that for noises with a continuous spectrum it is the noise in the immediate frequency of the masked tone which contributes to the masking.[1] When a very narrow band of noise is used to mask a pure tone, the masking increases as the bandwidth is increased until a certain bandwidth is reached. After this, as the bandwidth is increased the amount of masking remains constant. This bandwidth, at which the masking reaches a fixed value, is termed the critical bandwidth.

Two sets of four filters covering narrow portions of the speech band have been used to measure the amount of signal above the noise in certain bands. One set of filters had bandwidths about 3 db wider than the critical bands, the other set had bandwidths about 3 db narrower than the critical bands. Measurements were made with these bands using both pure tones and speech mixed

1. L. L. Beranek, "The Design of Speech Communications Systems", Proc. IRE, Vol. 35, pp. 882- Sept. 1947.

with noise. With pure tones no perceptable reduction of the signal threshold was obtained with the wider group of bands. On the narrower bands it was believed that a slightly weaker signal could be detected. Non-linear elements were also in conjunction with the narrower group of filters. This made the addition of the signal much easier to perceive, but the threshold level was not improved.

Measurements were also made through these bands with speech and noise. Wide band speech and white noise were mixed together and adjusted, subjectively, so that the speech was just intelligible. This mixture was then passed through the various filters. For the 3 db wider filters, the percentage of speech peaks greater than the noise was observed in each band over a five minute period. It appeared that about 10% of the speech was above the noise. For the 3 db narrower filters, very little speech greater than the noise was observed. No quantitative data was taken for this case.

From this study it is believed that some bands can be found in which a small percentage of speech is above the noise. However, no bands were found which gave a large speech to noise discrimination. There is no convenient way to evaluate the contributions of these few channel to speech intelligibility. It appears from this study that a complete multi-channel system must be built in order to adequately determine the usefulness of this type of noise reduction.

ESR:nan
October 8, 1956